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ALBINISM, PARTIAL ALBINISM AND POLYCHROMISM IN HAG-FISHES.

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IF hag-fishes are the most primitive of living 'fishes,' it is an interesting circumstance that they have not been known to have differentiated a wide range in coloration. In other groups mottlings and bright colors are the rule rather than the exception, but in hag-fishes blotches of color as well as colorless conditions have not hitherto been described. If, however, we consider that these fishes are, as a group, from relatively deep water, it is not to be wondered at that they have run the gamut of coloration common to deep sea forms — thus, in a range of species they pass from black (*Myxine circifrons* Garman), into dark purples, thence to violets and lavenders, then into "meaningless" grays, sometimes uniformly colored, sometimes shaded. In the latter event the dorsal region is the darkest, the ventral the lightest. In some instances lack of pigmentation in definite regions becomes a rather conspicuous feature: thus the tips of the barbels are often, indeed generally, white, and the mid-ventral as well as the mid-dorsal line in several species is unpigmented. In one case at least (*Homea stouti*) the lack of pigment in the mid-dorsal line becomes a prominent character of the newly hatched young (larval coloration), Aside from this we have had no detailed knowledge of the coloration of hag-fishes, and we could not, therefore, answer the question whether albinos, common in many and widely separate lines, occur also in this phylum of lowly chordates and whether mottled colors had already been evolved. In the event of mottled colors occurring in a single species one might justly infer that the blacks and violets and grays of this group are in reality but symptoms of a deep-water, or possibly of a nocturnal habit.

In regard to the first of these questions we may now, however, state definitely that true albinos occur among hag-fishes, and that partial albinos are not rare. A perfect albino of *H. burgeri*, Fig. 1, was collected at Misaki, Japan, but it was the only one observed in upward of 800 examples.[1] A specimen of *H. stouti* in part albino, white from snout to gill region, somewhat mottled where the white passed into the purple body color, Fig. 2, had formerly been observed by me at Monterey, Cal. (1899), together with several less perfect cases of the pigmentless condition,— these out of many hundred specimens collected. So one can justly conclude that in the myxinoid line albinism already plays its usual rôle among chordates.

The matter of motley coloring in hag-fishes is also elucidated rather strikingly in the case of a specimen of *H. polytrema* Girard, in excellent condition, which the writer recently received from the neighborhood of Valparaiso, Chile.[2] Fig. 3. The coloration of this species as far as one can determine from a single specimen, is brilliantly mottled with black, ashen, umber and ochre, to a degree which at once causes one to wonder whether this form has not been actually mimicking a murray. Indeed we learn from Dr. Delfin's interesting paper that the name of the fisherman for this hag-fish is the "bearded muræna," indicating

[1] My friend, Mr. Naohidé Yatsu, to whom I am indebted for the figures accompanying the present note, examined this specimen while it was still living and tells me that its color was white, but tinted slightly with yellow, instead of with pink as one would naturally suppose.

[2] For this specimen he is greatly indebted to the kindness of the Chilean ichthyologist, Dr. Federico Delfin, whose observations on the habits of this myxinoid are in many regards the most complete hitherto recorded.

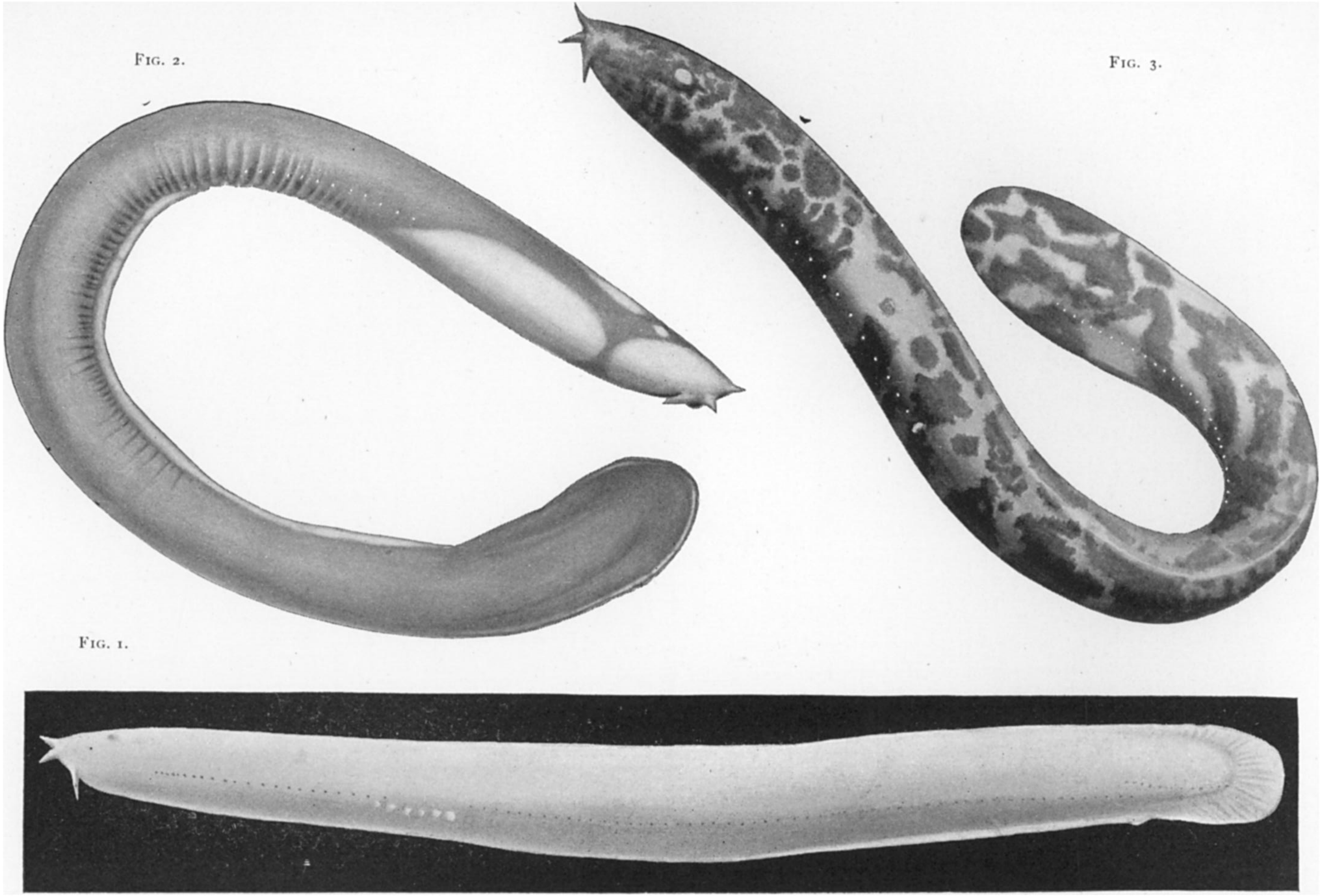

FIG. 2.

FIG. 3.

FIG. 1.

ALBINO AND POLYCHROMIC HAG-FISHES.

FIG. 1. *Homea burgheri*, Misaki, Japan. FIG. 2. *Homea stouti*, Monterey, Cal. FIG. 3. *Homea polytrema*, Valparaiso, Chile.

that the coloration of the present specimen is not abnormal.[1] In this regard, we can, however, derive no light from Girard's description published (1854) in the Chilean expedition report, for he states that his material of Bdellostoma was too poorly preserved to warrant any reference to coloration.

In the matter, accordingly, of the general color of hag-fishes, we can now, I think, reasonably conclude that if one species is provided with definite colors the entire group can hardly be different in this regard from other piscine groups, sharks, chimæroids, teleosts, in which deep sea forms are characteristically monochromic, and shallow water ones motley. And if we accept this conclusion, and it seems to me a sound one, we have still another ground for the belief — by analogy with other groups — that myxinoids are represented at the present day by but a small number of forms, in contrast with their maximum development in species and genera in early times.

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[1] In a reference to Wolnitzky (Baldomero), "Coast Fishery of the Province Aconcagua," *Buffalo Exposition* (1901) *Handbook*, *B. polytrema* is referred to as the "black Congrio," although this writer remarks that the name is a misnomer. No note as to coloration is, however, given.

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